(12) UK Patent Application (19) GB (11) 2 313 566 (13) A

(43) Date of A Publication 03.12.1997

(21) Application No 9709913.9

(22) Date of Filing 15.05.1997

(30) Priority Data
(31) 19621610 (32) 30.05.1996 (33) DE

(51) INT CL[6]
B25D 17/08

(52) UK CL (Edition O)
B4C C1A1 C6C

(56) Documents Cited
GB 2276578 A US 5603516 A US 5437465 A
US 5199833 A

(58) Field of Search
UK CL (Edition O) B4C
INT CL[6] B25D 17/08

(71) Applicant(s)
Robert Bosch GmbH

(Incorporated in the Federal Republic of Germany)

Wernerstrasse 1, Stuttgart-Feuerbach,
D-70442 Stuttgart 30, Federal Republic of Germany

(72) Inventor(s)
Helmut Lebisch
Otto Baumann
Ulrich Bohne
Rolf Mueller
Dietmar Saur
Egbert Schneider

(74) Agent and/or Address for Service
A A Thornton & Co
Northumberland House, 303-306 High Holborn,
LONDON, WC1V 7LE, United Kingdom

(54) Removable tool holder for a hand-held power tool

(57) A tool holder 21 is removable in a simple manner from a hand machine tool, in particular from a hammer drill and/or striking hammer. The hammer drill 10 comprises a spindle sleeve 18 , which projects from a machine housing 19 and into which a fitting piece 24 of a tool holder 21 is insertable and lockable by means of locking bodies 28. In the locking position, the locking bodies are radially overlapped by a retaining body 29, which is axially displaceable by means of an operating sleeve 33 . Retaining body 29 and operating sleeve 33 are supported so as to be axially displaceable relative to one another on the fitting piece 24.

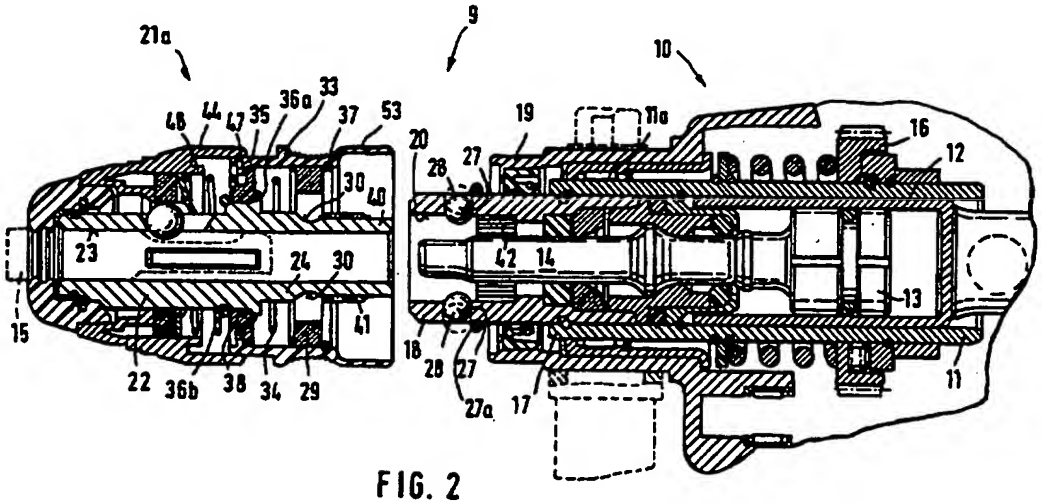

FIG. 2

BEST AVAILABLE COPY

GB 2 313 566

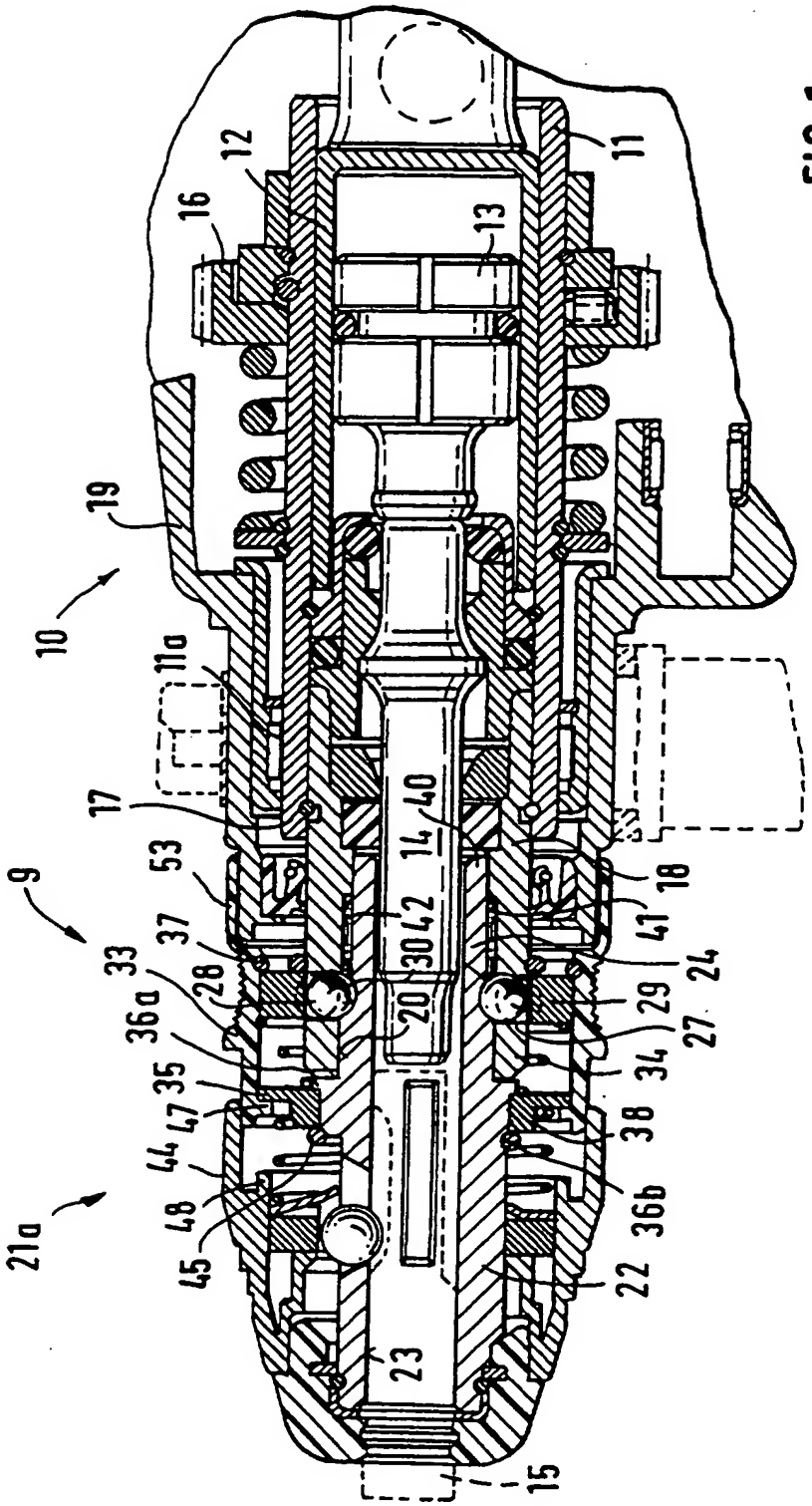
10
11
11a
12
13
14
15
16
17
18
19
20
21a
22
23
24
27
28
29
30
33
34
35
36a
36b
37
38
40
41
42
44
45
47
48
53
9

FIG.1

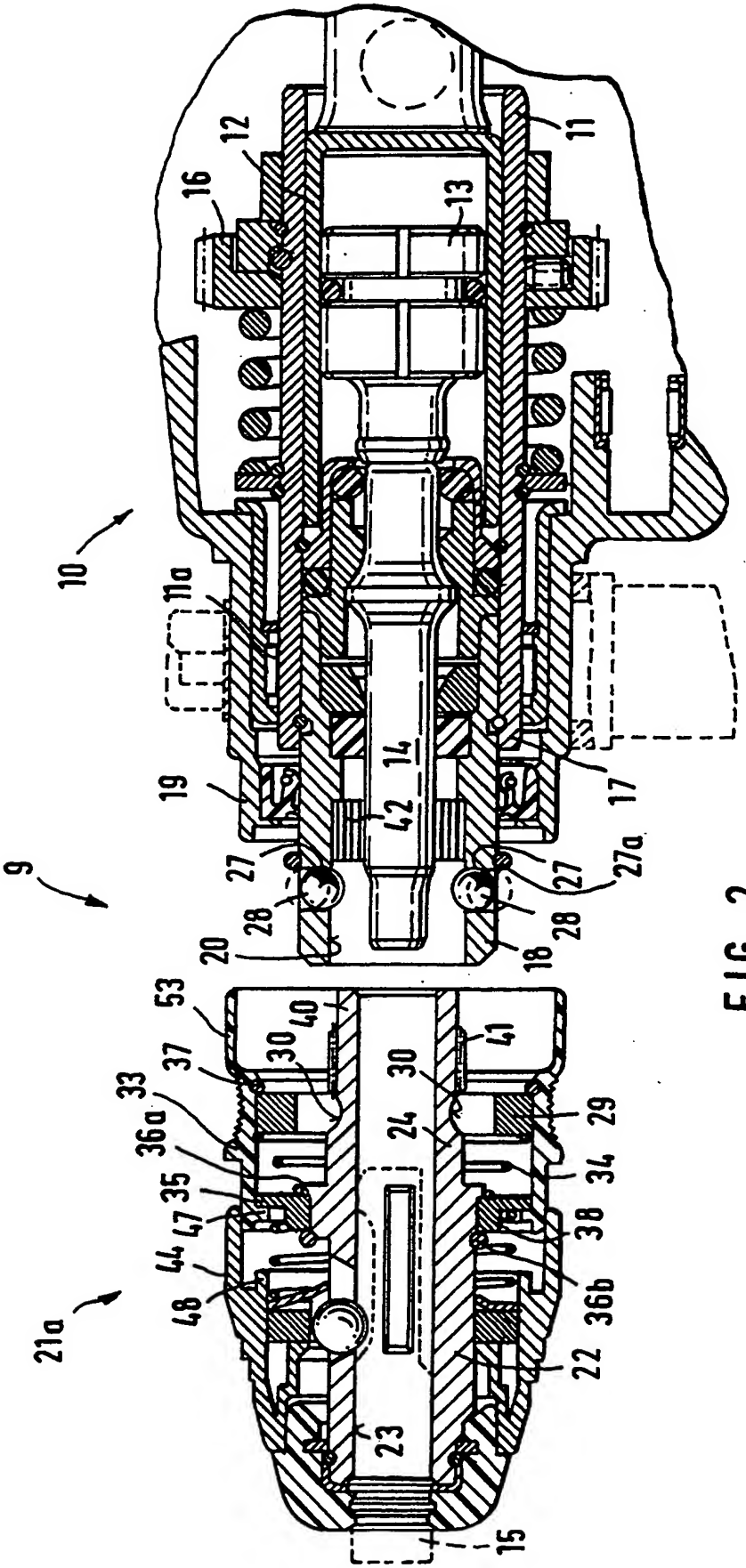
10
11
11a
12
13
14
15
16
17
18
19
20
21a
22
23
24
27
27a
28
29
30
33
34
35
36a
36b
37
38
40
41
42
44
47
48
53
9

FIG. 2

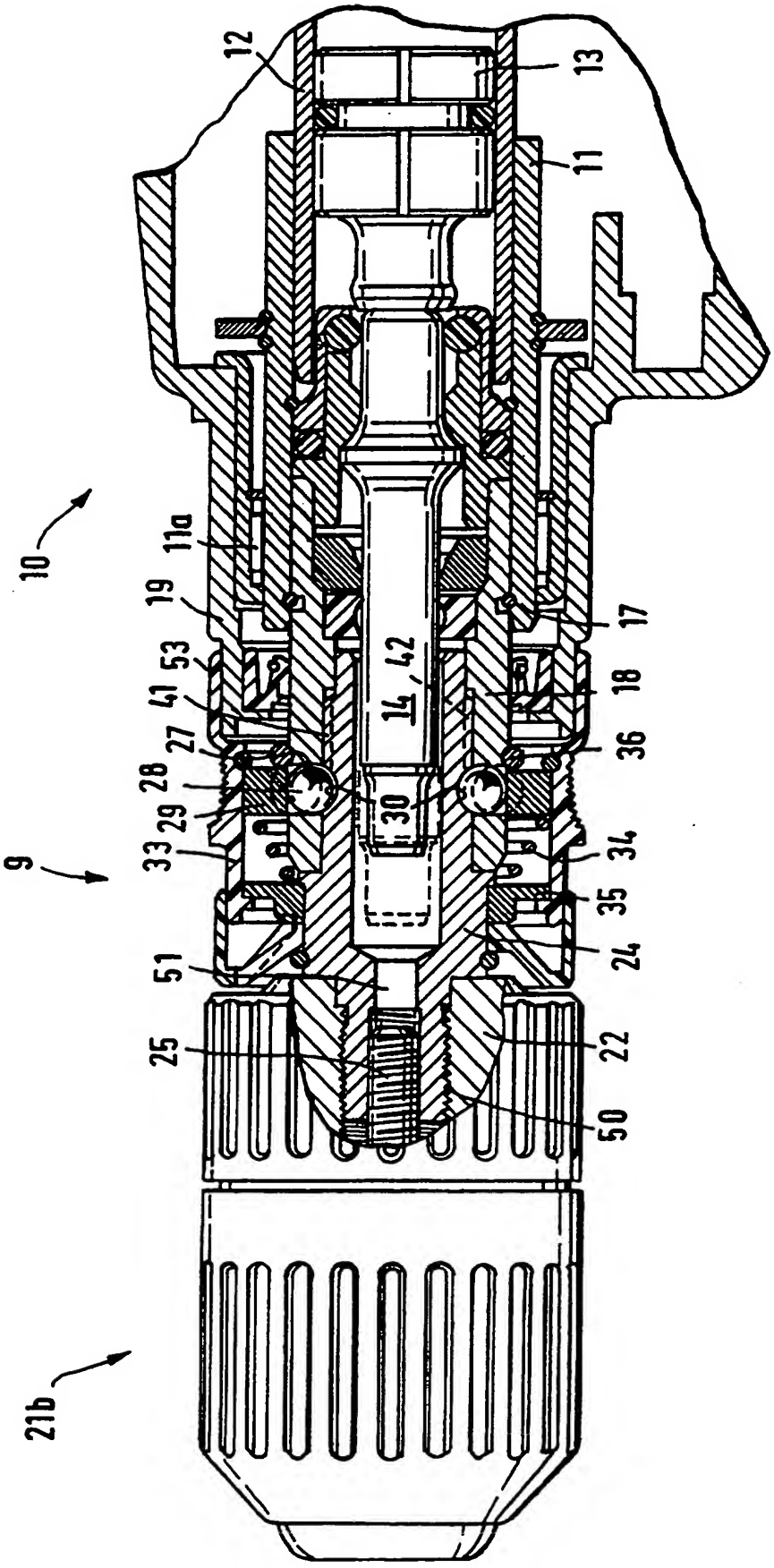
12
13
11
10
11a
19
17
53
41
14, 42
18
27
36
28
30
29
33
34
9
35
24
51
25
22
50
21b

FIG. 3

Device for changing the tool holder of a hand machine tool

Background art

The invention proceeds from a device for changing the tool holder of a hand machine tool according to the preamble of claim 1. Such a device is already known (EP-A-556 713), which discloses a fitting piece for a tool holder, which is insertable into a spindle sleeve of a hammer drill and fixable axially and in a peripheral direction therein by means of locking balls. In the locking position of the fitting piece on the hand machine tool, the locking balls engage into corresponding recesses in the fitting piece and in the spindle sleeve, being blocked radially in said position by means of a retaining body. The retaining body is axially displaceable by means of an operating sleeve for radially releasing the locking balls. The operating sleeve is held on the hand machine tool so as to be axially displaceable within limits. Since, in order to unlock the tool holder, the operating sleeve has to be displaced axially backwards, i.e. towards the machine, the machine collar is lengthened by the corresponding displacement distance.

Advantages of the invention

The tool holder changing device according to the invention having the features of claim 1 has the advantage of guaranteeing a compact construction of the hand machine tool with a correspondingly shorter machine collar. This is achieved in that the operating sleeve together with the retaining body is held on the tool holder and/or on the fitting piece.

Advantageous developments of the invention are possible by virtue of the measures described in the dependent claims. It is particularly advantageous when the spindle sleeve engages between fitting piece and retaining body and the at least one locking body is disposed in a radially movable manner in the spindle sleeve as this enables an automatic locking of tool holder and hand machine tool without the operator having to release the retaining body manually. A particularly user-friendly change of the tool holder is provided when the direction of release of the operating sleeve corresponds to the direction of withdrawal of the tool holder and/or fitting piece from the hand machine tool as this makes "single-handed operation" possible. It is also advantageous when the retaining body is axially displaceable relative to the operating sleeve because then the operating sleeve maintains its axial position during insertion and locking of the fitting piece. The loading of the retaining body in locking direction by means of a spring element enables an automatic resetting of the retaining body after insertion of the fitting piece into the spindle sleeve. A stop on the operating sleeve enables a driving of the retaining body and also a resetting of the operating sleeve by means of the spring element. The provision of separate means of rotationally driving the tool holder is also particularly advantageous because said means allow a torque transmission independent of the locking bodies and moreover facilitate the attachment of the tool holder to the hand machine tool.

Drawings

An embodiment of the invention is illustrated in the drawings and explained in detail in the following description. Figure 1 shows a section through the front part of a hammer drill, to which a tool holder for receiving a grooved-shank tool is attached, Figure 2 a section through the hammer drill according to Figure 1 with the tool holder

removed, and Figure 3 a section through the hammer drill according to Figures 1 and 2, to which a drill chuck is attached.

Description of the embodiment

In Figure 1, as an example of a hand machine tool having formed thereon a device 9 according to the invention for changing a tool holder 21a, b, the front part of a hammer drill 10 is shown. The hammer drill 10 comprises a hammer tube 11, which is supported by a bearing 11a so as to be rotatable relative to a machine housing 19 of the hammer drill 10. A hollow piston 12 is guided in an axially displaceable manner in the hammer tube 11. The hollow piston 12 receives a striker 13 which, in the percussion mode of the hammer drill 10, transmits axial impacts via a striking body 14 to a tool shank 15 indicated by dashes in Figures 1 and 2.

The hammer tube 11 is drivable in a rotational manner by means of a drive motor (not shown) via a gear wheel 16 of a gear unit (not shown in detail). At the tool-side end 17 of the hammer tube 11, a spindle sleeve 18 is accommodated in an axially fixed and non-rotatable manner in the hammer tube 11. With its side directed towards the tool shank 15, the spindle sleeve 18 forms a receiver 20 for a fitting piece 24, to which a tool holder 21a is fixed. The tool holder 21a has a basic body 22, which at one end forms a location opening 23 for the tool shank 15 and at the other end has the fitting piece 24 formed thereon (Figures 1 and 2). The fitting piece 24 may however alternatively be constructed separately and releasably connected to the basic body 22 of a tool holder 21b (Figure 3).

The sleeve-like fitting piece 24 has an outside diameter which corresponds substantially to the inside diameter of the receiver 20 in the spindle sleeve 18. In the tool-side

part of the spindle sleeve 18 at least one opening 27 is formed. In the illustrated embodiment, two openings 27 are situated opposite one another in the guide tube 18. Balls 28 serving as locking bodies are disposed in the openings 27.

In the locking position shown in Figure 1, the balls 28 are held by an annular retaining body 29 radially in engagement with an indentation 30 in the outer periphery of the fitting piece 24. The openings 27 and the indentation 30 together form corresponding recesses for a keyed connection of fitting piece 24 and spindle sleeve 18. In the illustrated embodiment, the indentation 30 takes the form of a circumferential groove so that the balls 28 upon engagement into the indentation 30 fix the fitting piece 24 axially in the spindle sleeve 18.

The retaining body 29 is surrounded by an operating sleeve 33 and held against the latter in an axially displaceable manner. The fastening sleeve 33 is in turn held by means of a stop ring 35 against the fitting piece 24 so as to be axially displaceable within limits. The retaining body 29 is loaded axially in the direction of its locking position by means of a spring element 34 in the form of a conical spiral spring. The spring element 34 is supported on the one hand against the stop ring 35 and on the other hand against the retaining body 29. The stop ring 35 is axially fixed on the fitting piece 24 between a step 36a and a locking ring 36b.

A retaining ring 37 is seated in a groove in the operating sleeve 33 and serves as a stop for the retaining body 29. When the retaining body 29 is applied against the retaining ring 37, the preloading force of the spring 34 is transmitted to the operating sleeve 33. At the side of the stop ring 35 remote from the hammer drill 10, the operating sleeve 33 has an inwardly directed projection 38, which

engages positively behind the stop ring 35 and hence forms a sliding stop preventing release of the operating sleeve 33 from the fitting piece 24.

Disposed in the region of the machine-side end 40 of the fitting piece 24 is a toothing 41 and in the spindle sleeve 18 a corresponding internal toothing 42, which are used to transmit torque to the tool holder 21 when the fitting piece 24 is inserted in the spindle sleeve 18.

The tool holder 21 for receiving grooved-shank tools, which is shown in Figures 1 and 2, is provided with a sliding sleeve 44 which is used to release the tool shank 15. The sliding sleeve 44 is preloaded axially in a forward direction by a pressure spring 45. The operating sleeve 33 and the sliding sleeve 44 engage one into the other and are displaceable relative to one another.

In Figure 2, the tool holder 21 is shown removed from the hammer drill 10. In said position, the locking bodies 28 are held inwards by a suitable reduction of the openings 27 and outwards by a ring 27a. The ring 27a partially radially overlaps the opening cross section of the openings 27.

For attaching the tool holder 21 onto the hammer drill 10, the fitting piece 24 is inserted by its end 40 into the receiver 20 until the toothing 41 lies against the corresponding toothing 42. In the process, the locking bodies 28 are pushed into the outer position indicated by dashes. When the tool holder 21 is then rotated relative to the guide tube 18 until the teeth and tooth spaces of the toothings 41, 42 stand opposite one another, the fitting piece 24 may be axially inserted further into the spindle sleeve 18. In the process, the tool-side end of the spindle sleeve 18 engages axially between fitting piece 24 and retaining body 29. Up to said point, the operator is not required to surmount any additional clamping forces, thereby

making it easier to find the correct rotational position of fitting piece 24 and spindle sleeve 18 relative to one another.

Because of the locking bodies 28 projecting out radially beyond the outer periphery of the spindle sleeve 18, the retaining body 29 upon further insertion is displaced axially against the action of the spring 34. As a result of the retaining body 28 being displaceable relative to the operating sleeve 33, the latter remains in its starting position. As soon as the indentation 30 and the openings 27 are radially lined up, the spring element 34 pushes the retaining body 29 and the latter pushes the locking bodies 28 inwards so that the balls 28 engage into the indentation 30 in the fitting piece 24 and form a keyed connection. Thus, an automatic locking of the tool holder 21 on the hammer drill 10 is guaranteed. The operating sleeve 33 need not be operated for said purpose. Because of the preloading by the spring element 34, the locking bodies 28 snap audibly into the indentations 30 so that the correct locking of the tool holder 21 is signalled to the operator.

To remove the tool holder 21 from the position shown in Figure 1, the operating sleeve 33 has to be displaced in an axially forward direction. During said process, the retaining body 29 is axially driven by the retaining ring 37. As soon as the retaining body 29 radially clears the openings 27, the locking bodies 28 may move radially outwards from the indentation 30. The tool holder 21 is then released and may be removed from the spindle sleeve 18.

In Figure 3, a drill chuck is attached as a tool holder 21 to the hammer drill 10. Here, the connecting means of tool holder 21 and hammer drill 10 correspond to the connecting means already described with reference to Figures 1 and 2. The fitting piece 24 and the basic body 25 here are of a two-part construction and are detachably screwed to one

another by means of a thread 50. In addition, a locking screw 25 is provided as protection against detachment during anti-clockwise rotation.

The tool holder 21 shown in Figure 3 may be released in the same manner by axially displacing the operating sleeve 33 in a forward direction and may be removed after disengagement of the locking bodies 28 from the indentation 30.

The invention is not confined to the illustrated embodiment. For example, spindle sleeve 18 and hammer tube 11 may alternatively be of an integral construction. Moreover, instead of an annular indentation 30 into which the at least one locking body 28 engages, it is possible to provide at least one recess delimited in a peripheral direction, e.g. a plurality of cups, by means of which the torque transmission is then also possible. A separate rotationally driving tooth system 41, 42 is then not required.

Claims

1. Device for changing the tool holder of a hand machine tool, in particular of a hammer drill and/or striking hammer, having a tool holder (21) which is releasably connectable by means of a fitting piece (24) to a spindle sleeve (18) of the hand machine tool (10), wherein at least one locking body (28) for radial engagement into mutually associated recesses (27, 30) in the fitting piece (24) and in the spindle sleeve (18) is provided, which is radially fixable in said engagement position by a retaining body (29), which with the aid of an operating sleeve (33) for release of the tool holder (21) is movable into a position radially releasing the at least one locking body (28), characterized in that the operating sleeve (33) together with the retaining body (29) is held in an axially displaceable manner on the fitting piece (24).

2. Device according to claim 1, characterized in that the spindle sleeve (18) is designed for engagement between fitting piece (24) and retaining body (29) and the at least one locking body (28) is disposed in a radially movable manner in each case in an associated opening (27) in the spindle sleeve (18).

3. Device according to one of claims 1 or 2, characterized in that the direction of release of the operating sleeve and/or of the retaining body (29) corresponds to the direction of withdrawal of the fitting piece (24) from the spindle sleeve (18).

4. Device according to one of the preceding claims, characterized in that the retaining body (29) is axially displaceable relative to the operating sleeve (33) and is loaded by a spring element (34).

5. Device according to claim 4, characterized in that the retaining body (29) is loaded by the spring element (34) into contact with a stop (37) disposed on the operating sleeve (33).

6. Device according to one of the preceding claims, characterized in that the fitting piece (24) is part of a basic body (22) of the tool holder (21).

7. Device according to one of claims 1 to 5, characterized in that the fitting piece (24) is releasably connected to a basic body (22) of the tool holder (21).

8. Device according to claim 6 or 7, characterized in that the operating sleeve (33) is held radially by a spacer (35), which is fixed axially relative to the basic body (25) and/or the fitting piece (24).

9. Device according to claim 8, characterized in that the spacer (35) forms an axial stop (38) for the operating sleeve (33).

10. Device according to one of the preceding claims, characterized in that provided between the recess (30) in the fitting piece (24) and one end (40) of the fitting piece (24) is a toothing (41) for rotational driving of the tool holder (21).

11. Device according to one of the preceding claims, characterized in that the operating sleeve (33) forms an axial projection (53), which surrounds the machine-side end of the fitting sleeve (24) and, when the

fitting piece (24) is attached onto the hand machine tool (10), engages over a part of a machine housing (19) of the hand machine tool.

12. A device for changing the tool holder of a hand machine tool substantially as herein described with reference to the accompanying drawings.

The Patent Office

11

Application No: GB 9709913.9 **Examiner:** Hal Young
Claims searched: 1-12 **Date of search:** 22 July 1997

Patents Act 1977
Search Report under Section 17

Databases searched:

UK Patent Office collections, including GB, EP, WO & US patent specifications, in:

UK Cl (Ed.O): B4C

Int Cl (Ed.6): B25D(17/08)

Other:

Documents considered to be relevant:

Category	Identity of document and relevant passage		Relevant to claims
A	GB 2276578 A	(BOSCH)	
X	US 5603516	(HILTI), see fig 2.	1-3,6,7, 10,11
X	US 5437465	(ATLAS), see fig 1.	1,2,4-7, 10,11
A	US 5199833	(BOSCH)	

X Document indicating lack of novelty or inventive step
Y Document indicating lack of inventive step if combined with one or more other documents of same category.
& Member of the same patent family
A Document indicating technological background and/or state of the art.
P Document published on or after the declared priority date but before the filing date of this invention.
E Patent document published on or after, but with priority date earlier than, the filing date of this application.

This Page is Inserted by IFW Indexing and Scanning Operations and is not part of the Official Record

BEST AVAILABLE IMAGES

Defective images within this document are accurate representations of the original documents submitted by the applicant.

Defects in the images include but are not limited to the items checked:

- ☐ BLACK BORDERS
- ☑ IMAGE CUT OFF AT TOP, BOTTOM OR SIDES
- ☐ FADED TEXT OR DRAWING
- ☑ BLURRED OR ILLEGIBLE TEXT OR DRAWING
- ☐ SKEWED/SLANTED IMAGES
- ☐ COLOR OR BLACK AND WHITE PHOTOGRAPHS
- ☐ GRAY SCALE DOCUMENTS
- ☑ LINES OR MARKS ON ORIGINAL DOCUMENT
- ☐ REFERENCE(S) OR EXHIBIT(S) SUBMITTED ARE POOR QUALITY
- ☐ OTHER: _____

IMAGES ARE BEST AVAILABLE COPY.
As rescanning these documents will not correct the image problems checked, please do not report these problems to the IFW Image Problem Mailbox.